

NORTON SOUND-BERING STRAIT SALMON RESOURCE INVENTORY  
INFORMATIONAL SUMMARY

by

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## ABSTRACT

Norton Sound Economic Development Corporation (NSEDCC) and the Alaska Department of Fish and Game (ADF&G) have entered into a cooperative agreement to initiate a comprehensive Salmon Resource Inventory of Norton Sound and the Bering Strait in response to the decline in salmon stocks in the area. This inventory has two phases; The Informational Summary and the Field Survey. The purpose of the Informational Summary was to collect, summarize and tabulate data, documents, studies and knowledge about fishery resources and related information from the drainages in this region. The methods by which this information was obtained was through a literature search and the distribution of approximately 2,000 Fishery Surveys to local residents. This information will be used along with results from the Field Survey to determine the opportunities for restoration and rehabilitation of salmon resources. A total of 143 references were obtained through the search for literature, and 72 surveys were returned.



## INTRODUCTION

Salmon fisheries in the Norton Sound region are very important to subsistence, commercial and sport fishermen. Norton Sound residents are dependent on the salmon resources for their livelihoods. Even though the total Norton Sound commercial salmon cash value is comparatively low, relative to other commercial salmon fisheries across the state, the cash value is multiplied when it is used to buy equipment and non-renewable resources with which to participate in the subsistence economic system harvests. It is this subsistence activity, made possible by the cash value of commercial salmon fisheries, of indigenous renewable resources which provides the majority of the nutritional and protein requirements of the indigenous people of the Norton Sound region. In the past several years, some salmon stocks have experienced a steady decline. There is great concern over the future of this natural resource given the amplified importance of the cash value of the commercial salmon fishery to the subsistence harvests of salmon and other resources.

Norton Sound Economic Development Corporation (NSEDC) and the Alaska Department of Fish and Game (ADF&G) have entered into a cooperative agreement to initiate a comprehensive Salmon Resource Inventory of Norton Sound and the Bering Strait. Communities involved are Brevig Mission, Diomedes, Elim, Gambell, Golovin, Koyuk, Nome, Savoonga, Shaktoolik, St. Michael, Stebbins, Teller, Unalakleet, Wales, and White Mountain. These communities are located in the fishing districts of Norton Sound and Port Clarence. For the purpose of this project, the Norton Sound District and Port Clarence District will be referred to as the Norton Sound region.

The purpose of the Salmon Resource Inventory is to identify and direct future conservation, restoration and enhancement opportunities for Norton Sound-Bering Strait salmon resources. The Salmon Resource Inventory is comprised of two phases: an Informational Summary and a Field Survey. This report deals with the Informational Summary.

The purpose of the Informational Summary was to collect, summarize and tabulate data, documents, studies, and knowledge about fishery resources and related information from drainages in the vicinity of Norton Sound and the Bering Strait. Information collected during the first phase of the project will be used along with information from the Field Survey phase to evaluate the opportunities available for restoring and increasing fish production in the Norton Sound Region. In addition, this information will be useful for orientation and background to expedite the newly-formed Regional Planning Team project development and planning process.

## METHODS

### *Literature Search*

An attempt was made to search for all relevant information that has been written about historic salmon fishery resources in the Norton Sound region. Information involving past, present and future restoration and rehabilitation salmon projects in the Norton Sound area were also targeted. Literature searches were performed by utilizing the Western Library Network, Bibliography of Alaskana, Dialog Databases, Wildlife Review, Fisheries Review, and the ADF&G Division of Habitat and Restoration (H&R) Library collection. Various reports, files and information were obtained from the Jim Raymond files (former ADF&G Fisheries Biologist). Information was also obtained from the ADF&G Nome area office library, Nome ADF&G Division of Commercial Fisheries Management and Development (CFM&D) Area Biologists Charles Lean, Fred Bue and Pete Velsko, ADF&G H&R Biologist Robert McLean and ADF&G Subsistence Division Resource Specialists Susan Georgette and Jim Magdanz. Mike Scott and Joe Webb, Fishery Biologists with the U.S. Bureau of Land Management (BLM) were also contacted and they provided various reports and information from their agencies. Reference materials often took the form of "grey" literature (e.g., memorandums, trip reports and unpublished reports) as well as published fisheries studies, documents and reports. Papyrus version 7.0 computer software was used to develop a comprehensive annotated bibliography from the 143 references obtained during the literature search.

### *Fishery Survey*

A Fishery Survey was developed for the purpose of asking Norton Sound residents about their fishery needs and to determine if there may be new opportunities for fishery development (Appendix A). Approximately 1,200 surveys were mailed to all box holders in Brevig Mission, Diomedes, Elim, Gambell, Golovin, Koyuk, Savoonga, Shaktoolik, St. Michael, Stebbins, Teller, Unalakleet, Wales, and White Mountain. Individuals were asked to fill out the forms and return them to the ADF&G office in Nome. Approximately 800 surveys were distributed in Nome by leaving them in key places around town such as the Native Corporations, the local college, and the public library. Public service announcements were placed on both radio stations, the local cable TV station and an advertisement was placed in the local newspaper.

## RESULTS

### *Historical Salmon Use*

Fish have been used as a food resource by the residents of the Norton Sound region for many centuries. Archeological evidence indicates intense fishing in the area dating back 2,000 years (Bockstoce 1979). Marine mammals were the principal food resource and fish was the second principal food resource of the early Norton Sound residents, with salmon as the mainstay (Ray 1975). During the summer, campsites were located near the mouths of streams. These campsites usually consisted of one or two families who harvested what they needed to feed their families and one or two dogs through the winter (Thomas 1982).

Contact with Western Civilization began in the late 18th century with European explorers visiting the region, and the development of fur trade by the Russians (Magdanz 1981). Trading increased after 1848 when hundreds of commercial whaling and trading ships visited the area (Ray 1975). Increased competition by these outsiders for walrus, caribou and other species may have increased the importance of salmon to area residents (Magdanz 1981).

In the late 19th century the size and use of dog teams expanded and wooden boats began to replace kayaks (Thomas 1982). As a result, the demand for dry fish as dog food increased as well as the development of better means to harvest the fish. Mining activities on the Seward Peninsula in the early 1900's brought about an increase in winter travel by dog team and the need for mail to be transported along the coast. Dog teams had to be supported by huge quantities of dry fish, further increasing the need for salmon harvest by local residents (Thomas 1982).

Dry fish became a major barter item due to the great need for dog food. Local residents would spend the summer harvesting and drying large numbers of salmon which consisted primarily of chum (Oncorhynchus keta) and pink salmon (O. gorbuscha). They would keep enough for their own use and barter or sell the rest to mining camps, roadhouses, trading posts and stores (Thomas 1982).

The number of people on the Seward Peninsula gradually decreased as gold deposits were worked out. Dog team travel decreased because of less mining activity; and, in the early 1930's, it abruptly declined with the introduction of the mail plane (Thomas 1982). The market for dry fish decreased in the early 1960's when commercial salmon fishing became a source for cash and the introduction of snowmachines replaced the need for large dog teams. Cash was becoming more available for trading at stores and dry fish was no longer a major trade item (Thomas 1982).

Commercial salmon fishing first began in the Norton Sound area during 1961 in the Unalakleet and Shaktoolik Subdistricts (McLean and Delaney 1977). Early fishery interest involved chinook and coho salmon which were flown to Anchorage in dressed condition for further processing. Chum and pink salmon were also purchased and processed by a single U.S. freezer ship during the 1961 season. The commercial fishery was expanded into Norton Bay, Moses Point and Golovin Bay Subdistricts in 1962. Since that time markets have often been sporadic and some subdistricts have been unable to attract buyers during the season (Lean, Bue, Lingnau, 1993). Historical subsistence and commercial salmon catches by species are found in Appendix B.

### *Norton Sound and Port Clarence District Boundaries*

The Norton Sound District includes all waters from Canal Point north to Cape Douglas (Figure 1). The district is divided up into six subdistricts:

- Subdistrict 1: Nome, from Penny River to Topkok Head
- Subdistrict 2: Golovin Bay, from Rocky Point to Cape Darby
- Subdistrict 3: Moses Point, from Elim Point to Kwik River
- Subdistrict 4: Norton Bay, from Kuiuktulik River to Island Point
- Subdistrict 5: Shaktoolik, from Cape Denbigh to Junction Creek
- Subdistrict 6: Unalakleet, from Junction Creek to Black Point

Each subdistrict contains at least one major salmon spawning stream. Subdistrict boundaries were established around the major salmon producing streams to minimize the interception of stocks bound for other areas. Five species of Pacific salmon occur in the Norton Sound area with chum salmon and pink salmon historically being the most abundant (Lean, Bue, Lingnau, 1993).

The Port Clarence District consists of all waters from Cape Douglas north to Cape Prince of Wales (Figure 1). This district includes the Salmon Lake and Pilgrim River drainage (Lean, Bue, Lingnau, 1993).

### *Salmon Resource Status*

The typical commercial salmon fishing season begins in mid June and targets king salmon (O. tshawytscha). The emphasis then switches to chum salmon about June 25, and during the third week of July there is a gradual shift to coho salmon. During even years pink salmon are abundant, but there is often no market for this species (Lean, Bue, Lingnau, 1993).

The Shaktoolik and Unalakleet Subdistricts target king, chum and coho salmon (O. kisutch) in their commercial fisheries. Chum catches have declined since the early 1980's, but king and coho

catches have remained fairly stable (Lean, Bue, Lingnau, 1993). Closed commercial periods were required during the 1993 season in the Unalakleet and Shaktoolik Subdistricts to achieve salmon escapement goals for chum salmon in each of the river systems (Bue 1993).

Commercial salmon fisheries in the Golovin and Moses Point Subdistricts target chum salmon, but harvests have dropped significantly since the 1980's. Restrictive management actions have occurred in the recent past where the fishing seasons have been closed by Emergency Order (E.O.) to achieve escapement and subsistence needs because there has been poor returns of chum salmon (Lean, Bue Lingnau, 1993). In 1993, the Moses Point Subdistrict was closed to commercial and sport fishing and, for the first time, subsistence fishing was restricted.

In the Nome and Norton Bay Subdistricts, there have been little or no commercial salmon catches. The Norton Bay Subdistrict has runs that appear to be adequate to allow a commercial harvest, but usually there are no available buyers. The Nome Subdistrict has had severe restrictions and closures because of very depressed chum salmon stocks (Lean, Bue, Lingnau, 1993). During the 1993 season, most of the chum salmon run was closed to sport, commercial, and subsistence fishing (Bue 1993).

Commercial salmon fishing in the Port Clarence District has been prohibited since 1967 because of the relatively small runs in the area and the existence of an important sockeye salmon subsistence fishery (Lean, Bue, Lingnau, 1993).

### *Escapement*

The escapement into a majority of the Norton Sound streams is monitored by aerial surveys. There has been a counting tower on the Kwiniuk River since 1965. From 1972-1974 and 1984-1986 another counting tower was operated on the North River, a major tributary of the Unalakleet River (Lean, Bue, Lingnau, 1993). Several other towers have operated for one or two seasons on the Niukluk, Chirosky, Shaktoolik, Boston, and Tubutuluk Rivers (Charles Lean, ADF&G Nome, personal communication). During the 1993 season a new counting tower project was also operated on the Nome River (Bue 1993). Comparative salmon escapement estimates for Norton Sound streams are shown in Appendix C and salmon survey counts of escapement into Norton Sound streams during the 1993 season are shown in Table 1.

### **Chinook Salmon**

The primary chinook salmon producing streams in Norton Sound are in the Unalakleet and Shaktoolik Subdistricts. In the Unalakleet, Shaktoolik, and Moses Point Subdistricts, 1993 chinook salmon

escapement surveys were above the historic average. Escapements in the Golovin and Norton Bay Subdistricts were average to slightly below average in 1993 (Bue 1993).

### **Chum Salmon**

The decline of chum salmon stocks throughout Norton Sound, and especially in the northern subdistricts, is a major concern of management biologists. Escapement goals in many of the Norton Sound river systems were not met in 1993 even with the restrictive management actions taken (Table 1). In 1993, chum salmon escapement in the Nome Subdistrict was approximately 75%-80% of the escapement goal. Moses Point Subdistrict achieved about 80% of its chum salmon escapement goal (Bue 1993). Low returns of chum salmon are also expected for the next several years because these fish will be returning from low parent year escapement (Bue 1993).

### **Coho Salmon**

The majority of coho salmon producing streams are in the Unalakleet and Shaktoolik Subdistricts, but coho salmon are found in nearly all of the pink salmon producing streams throughout Norton Sound. Overall escapement of coho salmon appears to be at the approximate historic average (Bue 1993).

### **Sockeye Salmon**

In the early to middle part of the 20th century, sockeye salmon (O. nerka) returns to Glacial Lake and Salmon Lake were heavily harvested and the population declined. Commercial fishing has been prohibited in the Port Clarence District since 1967 (Lean, Bue, Lingnau, 1993) and in the past 20 years, sockeye salmon returns have approximately doubled (C.F. Lean, ADF&G Nome, personal communication).

### **Pink Salmon**

Norton Sound pink salmon returns follow an odd/even year cycle and, for the past 10 years, even year returns have typically been larger than during odd years. In the 1992 season, new pink salmon escapement records were set by the Kwiniuk River counting tower and the Unalakleet River test fishing project, as well as several aerial survey indices on other river systems (Lean, Bue, Lingnau, 1993).

### *Economic Value*

Earnings from the Norton Sound 1993 commercial salmon fishery ranked as the lowest value on record since 1976 (Table 2). Approximately \$322,117 was paid to commercial fishermen for their catches in 1993. These earnings were 35% below the previous 5-year average of \$492,425 (Bue 1993). Norton Sound is a minor producer of salmon compared to other parts of the state, but the area's commercial salmon fisheries are important to local economy and provide a much needed cash income. The commercial salmon fisheries provide cash for the subsistence activities which provide the majority of the nutritional needs of the Norton Sound residents.

### *Fishery Survey*

Approximately 2,000 surveys were distributed in the Norton Sound-Bering Strait area in November 1993. Of these, 72 surveys were returned to the ADF&G office in Nome (Table 3). Survey results were tabulated for all returns (Appendix D) and for returns for each community (Appendix E.1. through E.14.). One surveys that was returned was not included in the results because the answers were inappropriate.

**Question 1:** The first question on the survey asked if people fished for salmon for subsistence use only, or commercial use only, or a combination of subsistence and commercial use. Most respondents indicated that subsistence was the most common use of fish (53 responses) (Appendix D), however, Elim was the only community where a combination of subsistence and commercial use was more common than either subsistence or commercial use alone (Appendix E.2).

**Question 2:** This question asked for the number and kind of salmon that are fished for and the location where fish are caught. Results for Question 2 were grouped by species caught and area fished. It was not possible to quantify the actual numbers of fish caught because answers usually took the form of "enough to get through the winter" and "put up enough for my family". Survey results showed that coho salmon was the species of salmon most often fished for with chum, pink, and chinook salmon ranked in descending order of importance (Appendix D). Most survey respondents stated that they use rivers that are relatively close to their community.

**Question 3:** Question three asked if commercial catches had changed or stayed the same during the past 10 years. The majority of data indicated that commercial catches have gone down; two respondents stated that commercial catches had stayed the same; and, one person stated catches had gone up (Appendix D).

**Question 4:** This question inquired if subsistence catches had changed or stayed the same in the past 10 years. Forty-three

respondees stated that subsistence catches had gone down; 24 responses indicated catches had stayed the same; and, six stated catches had increased (Appendix D).

**Question 5:** Question five asked for the respondent to suggest why catches had gone up or down. Twenty-four surveys provide no response; 4 people believed that catches increased because their fishing effort had increased; and 70 replies were given for the decrease in catches (Table 4). Some respondents listed more than one reason why catches had increased or decreased. The most common responses to why catches were down were the low number of fish returning, ADF&G regulations and restrictions, and intercept fisheries.

**Question 6 & 7:** These questions asked residents which species of salmon they would prefer to catch and where. The greatest overall response was for chinook salmon, with coho, chum, sockeye and pink salmon following in order of frequency. (Appendix D). Most respondents would like to catch fish from rivers close to their home community (Appendix E.1. through E.14.).

**Question 8:** This question inquired if people knew of areas where springs, creeks or rivers remained open in the winter. Thirty-two respondents stated they did know of areas where streams or rivers stayed ice free in the winter however some positive responses identified 19 drainages near seven communities (Table 5).

**Question 9:** Question nine asked for additional comments and concerns. A total of 35 responses was made (Appendix E.1. through E.14.). Most replies expressed concern over the lack of salmon returning to areas.

### *Restoration and Rehabilitation Projects*

Throughout the duration of the literature search, an effort was made to identify past, present and future projects related to stock restoration and rehabilitation of salmon resources and habitat in the Norton Sound-Bering Strait area. This was done to identify opportunities for future, more-detailed investigations. Forty-four references related to restoration and rehabilitation projects and opportunities were found during the literature search (Appendix F.1.). These typically took the form of memos and trip reports and encompassed everything from past projects to draft proposals to ongoing projects. Table 6 identifies some opportunities for rehabilitation and restoration identified in the literature search.

ADF&G, Division of Commercial Fisheries Management and Development has ongoing restoration projects of importance in the Nome area. One project operates "streamside salmon incubators" on tributaries of the Nome, Snake and Solomon Rivers (Figure 2). This is a pilot program which began in 1991 to study the potential of instream



incubation technology in western Alaska. Table 7 summarizes the production history for streamside incubators on the Nome and Snake Rivers. In 1993, a candidate incubation site was located on a Shovel Creek, a tributary of the Solomon River, and a test incubator was installed with 2,500 chum salmon eggs. If the site proves to be successful, a production level eggtake is anticipated for 1994 (Velsko 1993).

A project to rehabilitate the Windfall mining pit to improve coho salmon rearing habitat has begun, and the Nome-Beltz High School fisheries program is continuing. Proposals have also been developed for other projects, such as a recirculating incubator for salmon eggs using Nome's water source, Moonlight Springs (Pete Velsko, ADF&G Nome, personal communication). Winter stream surveys have been conducted in the past and present to locate other areas suitable for instream incubation technology (Bue 1990; Pete Velsko, ADF&G Nome, personal communication).

The ADF&G, Habitat and Restoration Division initiated or participated in seven salmon enhancement/restoration projects between 1985 and 1993 in the Norton Sound area (ADF&G 1993). Most of these projects involved rearing habitat restoration, reestablishing culverts and correcting fish passage problems, and restoration of stream channels. In addition, there are other pending and conceptual projects being considered (ADF&G 1993).

ADF&G personnel have studied various opportunities in the vicinity of Elim and Unalakleet to determine the feasibility of salmon restoration in the area (Gaither 1989; Kalb 1990; Kraus and Kalb 1991; Velsko 1991; Velsko 1992). These trips included a feasibility study for a potential hatchery site at Elim Hot Springs, installing test incubators, and performing stream surveys.

Project Biologists from ADF&G and the BLM met in January 1990 to discuss fisheries enhancement planning in the Nome area. Goals and projects for enhancing anadromous fish populations were discussed and several potential projects were identified. The BLM has also conducted or proposed a variety of fishery habitat enhancement and rehabilitation projects throughout the Norton Sound area in conjunction with ADF&G (Webb 1988; Webb 1991; Webb and McLean 1991). The BLM developed the Norton Sound Aquatic Habitat Management Plan and Project Supplements in cooperation with ADF&G in 1988. This plan outlines a number of objectives and actions for possible enhancement opportunities at specific sites (Webb 1988). Examples include lake and stream habitat improvement, rehabilitation of areas that were damaged from past development and inventories of fish populations and fish habitat, fish harvest and angler effort and use.

## DISCUSSION

### *Salmon Resource Status*

The decline of the chum salmon stocks in the Norton Sound-Bering Strait region since the early 1980's is of greatest concern to ADF&G management biologists. The northern subdistricts seem to be most effected by this chum decline. Even with severely restrictive management actions such as the closure of sport, commercial and subsistence fishing in some subdistricts, the problem of low escapement into most river systems continues. Escapement of chinook, coho, sockeye and pink salmon appear to be approximately at or above the historic average. None, however, except pink salmon during even numbered years, are abundant.

Norton Sound salmon fishery resources are considered minor when compared to fisheries in other parts of the state, but subsistence and commercial fishing provide a major food resource and cash income to this region. Restrictions on salmon fishing because of declines are necessary to provide for escapement and protect future salmon runs and these restrictions place an economic and subsistence burden on many communities.

### *Fishery Survey*

Responses to the Fishery Survey indicated that subsistence was the most important use of salmon and coho salmon was the preferred species, followed by chum, pink, chinook and sockeye salmon. It is interesting however, that, given a choice, people would like more chinook, coho, chum, sockeye and pink salmon, in that order.

The majority of respondees indicated that both subsistence and commercial catches had decreased in the last ten years. The most common opinions given for this decrease was the low number of fish returning to rivers and streams and ADF&G regulations and restrictions.

A total of 19 drainages were identified where springs or open water occurred year round. These may be suitable sites for instream incubation boxes, but these must be investigated further to determine if any sites are appropriate.

### *Opportunities*

A pilot project to investigate the feasibility of instream incubation technology in western Alaska has provided encouraging results in the Nome area but the first substantial return of adult

chum salmon is not expected until after 1995 (Table 7). Even with these encouraging results, more research on salmon egg-to-fry development, fry escapement and survival rates are needed. Work is also needed to improve technology and expand production. A field survey of the Sinuk River in January 1994 led to the discovery of a fourth possible incubation site (Pete Velsko, ADF&G Nome, personal communication). Replies from the Fishery Surveys indicate more sites may be suitable for instream incubation technology in other areas of Norton Sound. Field surveys of these sites must also be made to accurately evaluate their potential.

Suitable instream incubation sites are difficult to locate and may not be possible for some river systems. The remote nature of most river systems and lack of access to sites are factors that limit this technology. Alternative egg incubation strategies are being explored by ADF&G staff in Nome (Pete Velsko, ADF&G Nome, personal communication). There is also a wide variety of restoration and rehabilitation techniques that can be applied such as rehabilitation of natural spawning habitat, and creating spawning channels (Table 8). There may be some areas where no improvement techniques are suitable.

The Norton Sound Aquatic Habitat Management Plan developed by BLM in cooperation with ADF&G has outlined actions and projects needed in Norton Sound area. Supplements to this plan give project background, methodologies and expected costs for four specific projects: Norton Sound Coho Salmon Project; Nome Area Rivers Habitat Rehabilitation and Enhancement Project; Seward Peninsula Riparian Habitat Inventory; and Imuruk Basin Salmon Spawning Habitat Utilization Study. Some of the projects BLM has proposed have been completed or started and await further funding. This management plan can be used as a basis for future work and funding. These potential project opportunities will also be reviewed and evaluated by the newly formed Norton Sound Regional Planning Team. Regional planning is important to identify and coordinate these activities with management strategies.

Careful planning is also required before any project action can begin. Most importantly, there must be a clear statement of purpose. Why is the project being done? What is the intended end result? The appropriate approach for the project may be quite different if the purpose is to address a man-made perturbation than if the purpose is to "improve fish habitat" or "create more fish". If "more fish" are desired, this can be accomplished only if the "limiting factor" is clearly understood. Fish rely on many "types" of habitat during their life cycle; typically, one or more will limit the size of the fish population. Therefore; if a larger fish population is desired, that particular limitation must be changed. In other words, it will be a waste of time and money to improve rearing habitat for juvenile fish in a stream if water quality (i.e., temperature, dissolved oxygen, chemicals, or silt) precludes successful spawning or if a barrier disrupts migration.

Conversely, why improve migration if spawning habitat is not available.

Several permits are required before most projects can be implemented and it is imperative to allow ample time to obtain these permits. Whenever stream habitat is affected, a permit by the ADF&G Division of H&R is required and if eggs or fish populations are manipulated (e.g., if eggs will be taken and placed in an incubation box) a "Fish Transport Permit" must first be obtained from ADF&G. Although the permitting process may be long and frustrating, it is important to remember, that the purpose of permits is to ensure that viable restoration or enhancement projects involve minimal negative impact to our valuable fish habitat or wild fish stocks. Furthermore, the long range impacts of such projects need to be considered, including the fishery management system needed for the resulting returns.

### CONCLUSIONS

The literature search documented 143 references with relevant information about the salmon fishery resource in the Norton Sound-Bering Strait Region. The Fishery Survey was used as a method for gathering information on opportunities for fishery development as well as giving residents of the Norton Sound-Bering Strait region a chance to express their concerns and needs. Approximately 2000 surveys were distributed and 72 responses returned to the ADF&G office in Nome.

There is great concern over the declining runs of salmon in the Norton Sound-Bering Strait Region. Drastic ADF&G management actions have been taken, yet chum salmon escapement into some drainages continues to fall short of goals. Results from the literature search and Fishery Survey indicate opportunities do exist for rehabilitation and restoration of salmon resources in the Norton Sound-Bering Strait region. These opportunities need to be investigated further. The newly formed Regional Planning Team must be involved in all aspects of planning to ensure these opportunities are identified and coordinated. Special attention needs to be placed on the planning and permitting process involved before any activity is undertaken. It must be stressed that there are no quick and easy solutions. Restoration of the salmon resource will not happen overnight, but will have to occur gradually through a combination of management and rehabilitation strategies.

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Table 1. Salmon escapement survey counts of Norton Sound streams and associated chum salmon escapement goals, 1993.<sup>ab</sup> (Source: CFM&D 1993 Season Summary)

Stream Name	Number of Fish					Chum Goal
	Chinook	Coho	Sockeye	Pink	Chum	
Salmon L.			3,101			
Glacial L.			419			
Sinuk R.	7	104	30	5,120	1,570	4,500
Snake R.					317	1,000
Nome R.	56 <sup>a</sup>	3,061 <sup>a</sup>		9,212 <sup>a</sup>	1,520	2,000
Flambeau R.					1,590	3,250
Eldorado R.	38	110		120	2,885	5,250
Bonanza R.		510				1,500
Solomon R.		128		900	415	550
Fish R.	48			13,440	12,695	17,500
Boston Cr.	227			1,930	4,513	2,500
Niukluk R.	15	2,104		2,840	19,910	8,000
Ophir Cr.		14				
Kwiniuk R.	565 <sup>a</sup>	1,238		43,065 <sup>a</sup>	15,823 <sup>a</sup>	19,500 <sup>d</sup>
Tubutulik R.	1,061	1,395		18,650	8,740	12,000
Inglutalik R.						8,500
Ungalik R.	156			66,120	10,180	2,500
Shaktoolik R.	712			85,320	5,515	11,000
Unalakeet R.	253					
North R.	900	1,397		13,570	445	2,000
Old Woman R.	387					100
Kogok R.		115		70	70	
Pikmiktalik R.		525			150	

<sup>a</sup> Species identification difficult where large numbers of pinks salmon were observed.

<sup>b</sup> Counts should be considered minimal values because of variable counting conditions.

<sup>c</sup> Preliminary; expanded from tower counts.

<sup>d</sup> Goal for tower count.



Table 2. Estimate value of Norton Sound District commercial salmon fishery, 1962-1993. (Source: CFM&D Annual Management Reports and Season Summaries).

Year	Gross Value of Catch to Fishermen
1962	\$105,800.00
1963	\$104,000.00
1964	\$51,000.00
1965	\$21,483.00
1966	\$68,000.00
1967	\$44,038.00
1968	\$63,700.00
1969	\$95,297.00
1970	\$99,019.00
1971	\$101,000.00
1972	\$102,225.00
1973	\$308,740.00
1974	\$437,127.00
1975	\$413,255.00
1976	\$285,283.00
1977	\$528,610.00
1978	\$814,221.00
1979	\$876,547.00
1980	\$583,388.00
1981	\$758,471.00
1982	\$988,588.00
1983	\$1,038,967.00
1984	\$721,055.00
1985	\$822,056.00
1986	\$539,576.00
1987	\$504,631.00
1988	\$754,751.00
1989	\$335,928.00
1990	\$497,623.00
1991	\$425,430.00
1992	\$448,395.00
1993	\$322,117.00

Table 3. Numbers of Norton Sound Fishery Surveys distributed and returned.

Community	Number of surveys	
	Distributed	Returned
Brevig	68	3
Diomedes	50	0
Elim	75	6
Gambell	148	1
Golovin	75	1
Koyuk	75	3
Nome	800	16
Savoonga	60	1
Shaktoolik	70	4
St. Michael	86	3
Stebbins	110	3
Teller	63	1
Unalakleet	225	25
Wales	65	1
White Mountain	76	3
Unknown		1
Totals:	2,046	72

Table 4. Summary of reasons given for the rise or decline in commercial and subsistence salmon catches in Norton Sound-Bering Strait Region in the last 10 years. See Appendix D.1. for detailed information.

Reason	Number of Responses
catches up:	
increased effort	4
catches down:	
Low # of fish returning/lack of fish	20
ADF&G regulation/restrictions	11
Intercept fisheries	9
Poor weather	6
Not sure/don't know	4
High seas fishing	4
Heavy commercial fishing	3
Too many trout in the rivers	2
less effort	2
Lack of food for fish to feed on	1
seasonal changes	1
Large # of gillnets in ocean just outside river mouths	1
No buyers for commercial fish	1
Late breakup some years	1
No salmon enhancement program	1
American factory trawlers bycatch	1
People use purse seine nets to take too many fish	1
Lack of state funding	1

Table 5. Norton Sound-Bering Strait drainages that were identified with springs or open water in winter.

Village	Area
Brevig Mission:	California River Black Mountains
Elim:	Iron Creek Clear Creek Horseshoe Creek
Koyuk:	Granite Mountain Hot Springs
Nome:	Nome River Snake River Shovel Creek
Shaktoolik:	Shaktoolik River
Unalakleet:	South River drainage Unalakleet River North River Egavik River Golsovia River Shaktoolik River Ungalik River Old Woman River
White Mountain:	Koochiblock (Klokerblok River)

Table 6. Opportunities related to rehabilitation and restoration in the Norton Sound-Bering Strait Region.  
(See Appendix F for corresponding reference number)

Community/Area	Drainage	Species	Type of Project or Opportunity	Agency	Reference Number
Nome Area	Sinuk River	chum	possible instream incubator site	ADF&G	Pete Velsko, ADF&G Nome personal communication
	Anvil Creek	coho	interconnecting mining ponds with creek to provide rearing habitat	ADF&G; Nome Beltz High School	2
	Glacial Lake	sockeye	limnological and fishery survey	ADF&G; BLM	9; 21
Shaktoolik Moses Point Norton Bay	Shaktoolik River Unglik River Inglutalik River Tubutulik River Fish River	coho	Norton Sound coho salmon project	BLM	4
Elim	Iron Creek	all species	replacement of culvert to allow fish passage	ADF&G	Charlie Lean, ADF&G Nome personal communication
	Quiktalik Creek	chum	possible instream incubation site that needs investigation	ADF&G	Pete Velsko, ADF&G Nome personal communication
	Miniatulik Creek	chum	possible instream incubation site that needs investigation	ADF&G	39
Port Clarence	Kuzitrin River Aqiapuk River Imuruk Basin drainages	salmon	Imuruk Basin salmon spawning habitat utilization study	BLM	7
	Salmon Lake	sockeye	limnological and fishery survey	ADF&G; BLM	3;9;21
All		pink chum	recirculating incubation technology	ADF&G	Pete Velsko, ADF&G Nome personal communication

Table 7. Instream incubation production summary for the Nome area.  
(Source: Pete Velsko, ADF&G Nome)

Hobson Creek-Nome River:					
Brood Year	Species	Numbers of Eggs	Estimated number of fry <sup>a</sup>	Potential Adult Return <sup>b</sup>	Year <sup>c</sup>
1991	chum	20,000	3,000	19	1995
1992	chum	140,000	65,000	403	1996
				226	1997
1993	chum	110,000	77,000	477	1997
				268	1998

Boulder Creek-Snake River:					
Brood Year	Species	Number of Eggs	Estimated number of fry <sup>a</sup>	Potential Adult Return <sup>b</sup>	Year <sup>c</sup>
1991	pink	10,000	8,000	80	1993
1992	chum	65,000	45,000	279	1996
				156	1997
1993	chum	100,000	70,000	434	1997
				243	1998

<sup>a</sup> Estimated green egg to fry emergence survival is 70%.

<sup>b</sup> Estimated ocean survival is 1%.

<sup>c</sup> Age-class composition of adults is 62% 4-year olds; 35% 5-year olds.

Table 8. Restoration and rehabilitation techniques.

<u>METHOD</u>	<u>APPROACH</u>	<u>CRITERIA FOR POTENTIAL PROJECT</u>	<u>TARGET SPECIES</u>	<u>POTENTIAL BENEFIT</u>	<u>POTENTIAL COST</u>
<u>Egg Incubation boxes;</u>					
to provide or improve salmon fry production	Non-freezing ground water is fed into a box with eggs; after hatching, the fry migrate out into the environment	spring or seep that is free-flowing year round; access to ocean; good volume	sockeye, pink, chum	depends on number of boxes and volume of water	develop site; annual maintenance and egg take
<u>Spawning channels;</u>					
to create new spawning	capture and channelize non-freezing (up welling) ground water; provide spawning gravel; natural fry migration	spring or seep that is free flowing year-round; access to ocean; best if spawning already occurs nearby	sockeye pink chum coho	depends on area and number of spawners	develop site; gravel; small annual costs
<u>Blockage removal;</u>					
to improve out migration for young; immigration for adults	physical removal; possible conduits through beaver dams, gravel berms, log jams, etc. Engineering support helpful	barrier of previous good salmon producer; good spawning and rearing habitat upstream from barrier to fish passage	all	little to great depends on amount and quality of new habitat	may require heavy equipment or hand labor; probably requires annual effort
<u>Fish Pass;</u>					
to allow migration above a barrier falls or cascade	install fish ladder to allow fish to migrate above an obstacle; or blast or construct "step-pools"	vertical falls (e.g. 5-6ft) or steep cascade that prevent fish upstream migration to use spawning and rearing habitat	all	little to great depends on amount and quality of new habitat	Depends on magnitude of barrier and accessibility; develop site; annual monitoring and maintenance
<u>Rearing habitat;</u>					
improvement or construction to supply habitat for young fish	provide cover in existing area or construct new habitat by excavation or by damming to create pool-like habitat; e.g., to resemble beaver dam pools; or re-capture former oxbows or meanders	ample spawning habitat without adequate rearing habitat; degraded stream habitat; low land or swamp with potential dam site	usually coho, also chinook	approximately 25-200 adults per acre depending on habitat quality	may be low; depends on access; little annual cost

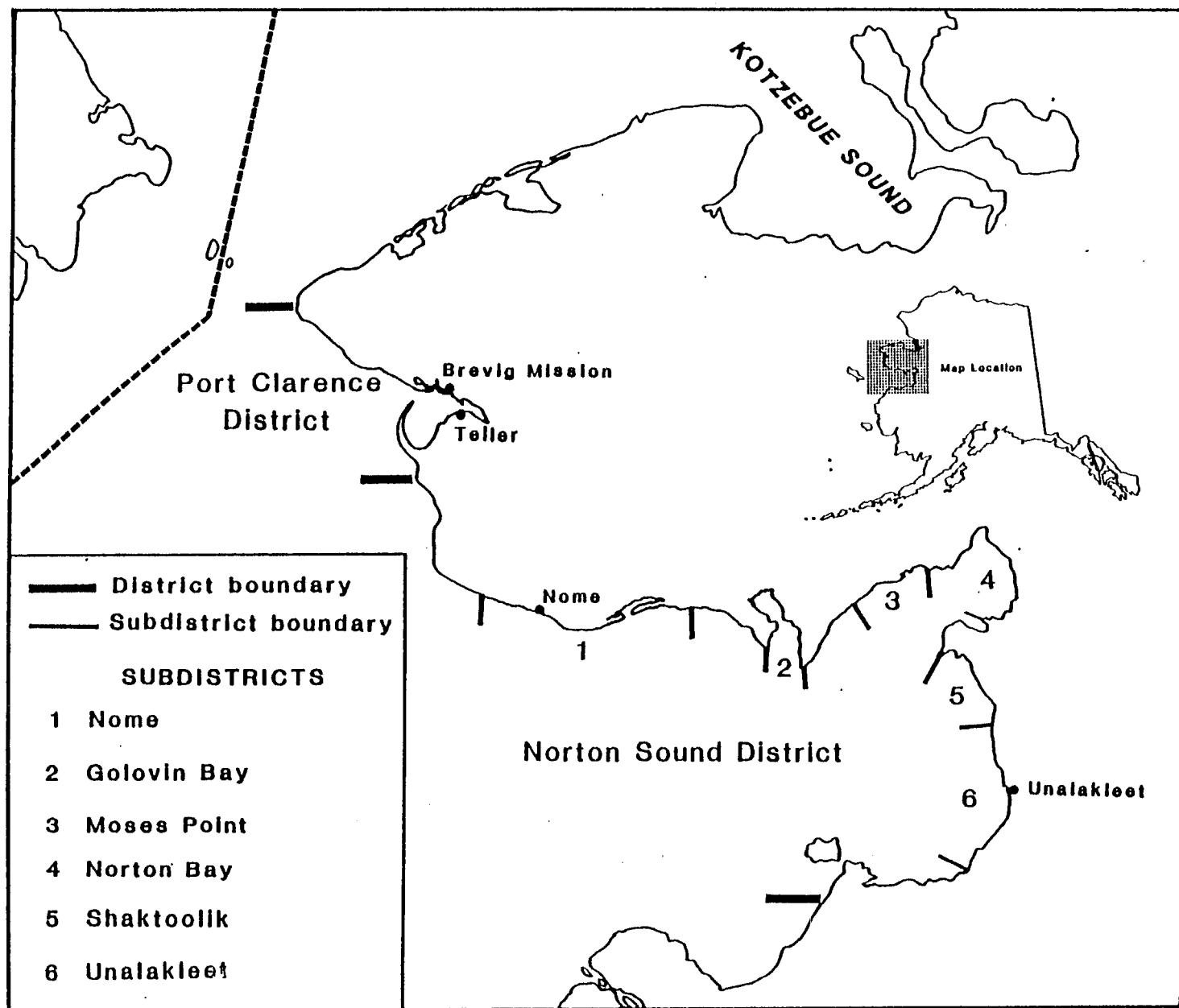


Figure 1. Norton Sound and Port Clarence Districts.



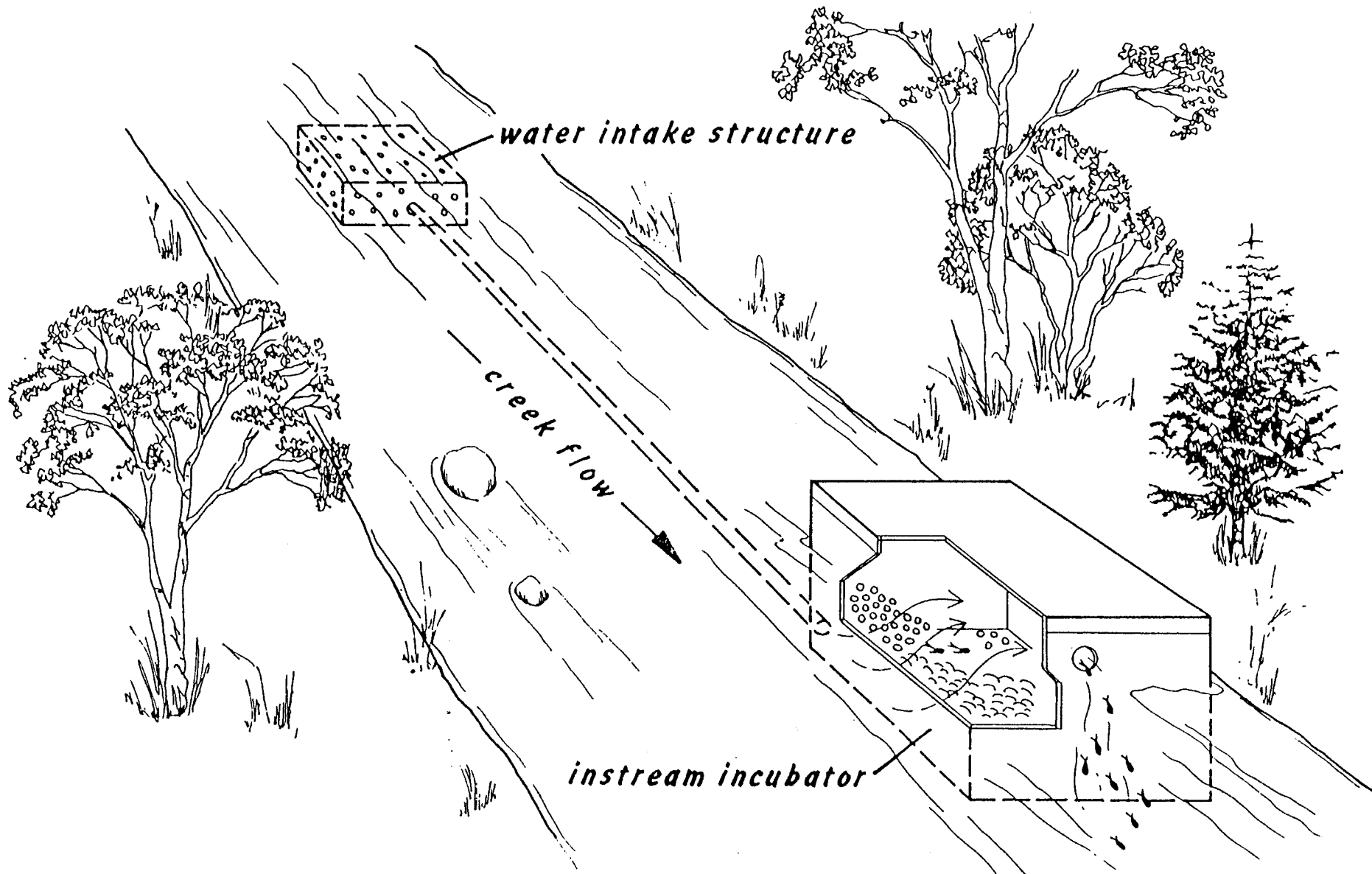


Figure 2. The INSTREAM INCUBATOR (streamside incubator or hatch box) is an incubator designed to incubate salmon eggs and alevins (small fish) under conditions similar to those in natural spawning beds. The incubators are usually positioned in the stream or on the stream bank. Water is directed downstream through a pipeline which supplies the eggs with a continuous flow of oxygen-enriched water. These systems are gravity fed and don't require pumps or electricity. Force of gravity moves the water down the pipe and up through the eggs. Once fertilized eggs have been placed in the incubator, little maintenance is required. The eggs develop through the winter in a protective environment. In spring the young fry migrate out of the incubator to begin their long migration out to sea before returning as adults.

## Appendices

## Appendix A. Norton Sound 1993 Fishery Survey

Dear Norton Sound/Bering Strait Residents,

The Norton Sound Economic Development Corporation (NSEDC) and the Alaska Department of Fish and Game (ADF&G) want to learn more about your salmon fishery needs in this region. We are gathering information to find out where the opportunities are for fishery development in our area. We need your help! Please fill out this Fishery Survey and return it by December 10, 1993. You can mail the survey back to ADF&G by folding it into thirds with the ADF&G return address showing. If you have any questions you can call ADF&G (Pete Velsko or Betsy Brennan) at 1-800-478-2271 or NSEDC (Tim Smith) at 443-5352.

Thank you for your time and help.

\*\*\*\*\*

### Norton Sound 1993 Fishery Survey

Name \_\_\_\_\_ Village \_\_\_\_\_  
Phone # \_\_\_\_\_ Date \_\_\_\_\_

1. Check one:

- I fish for salmon for subsistence use. \_\_\_\_\_  
I fish for salmon for commercial use. \_\_\_\_\_  
I fish for salmon for both commercial and subsistence use. \_\_\_\_\_

2. Please name the kinds of salmon you fish for and where you catch them.  
Subdistrict/rivers/locations      Species of fish (e.g. chum, king...)      Numbers


(Please check one)

3. My commercial catches have gone up \_\_\_\_\_ or down \_\_\_\_\_ or stayed the same \_\_\_\_\_ in the past 10 years.

4. My subsistence catches have gone up \_\_\_\_\_ or down \_\_\_\_\_ or stayed the same \_\_\_\_\_ in the past 10 years.

5. If your catches have gone up or down, what was the reason for this?

6. What kind of salmon would you like to see more of in your area?

king \_\_\_\_\_ silver \_\_\_\_\_ reds \_\_\_\_\_  
chum \_\_\_\_\_ pink \_\_\_\_\_

7. In which rivers or areas near your village would you like to see more salmon?

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?    yes \_\_\_\_\_ no \_\_\_\_\_

9. Do you have any other comments or concerns?

Appendix B. Commercial and subsistence salmon catches by species, all subdistricts, Norton Sound District, 1961-1993.  
(Source: CFM&D 1993 AMR)

Year	Commercial						Subsistence					Combined					
	Chi-nook	Sock-eye	Coho	Pink	Chum	Total	Chi-nook	Coho	Pink	Chum	Total	Chi-nook	Sock-eye	Coho	Pink	Chum	Total
ALL SUBDISTRICTS																	
1961	5300	35	13807	34327	48332	101801	-	-	-	-	-	5300	35	13807	34327	48332	101801
1962	7286	18	9156	33187	182784	232431	-	-	-	-	-	7286	18	9156	33187	182784	232431
1963	6613	71	16765	55625	154789	233863	5	118	16607	17635	34365	6618	71	16883	72232	172424	268228
1964	2018	126	98	13567	148862	164671	565	2567	9225	12486	24843	2583	126	2665	22792	161348	189514
1965	1449	30	2030	220	36795	40524	574	4812	19131	30772	55289	2023	30	6842	19351	67567	95813
1966	1553	14	5755	12778	80245	100345	269	2210	14335	21873	38687	1822	14	7965	27113	102118	139032
1967	1804	-	2379	28879	41756	74818	817	1222	17516	22724	42279	2621	-	3601	46395	64480	117097
1968	1045	-	6885	71179	45300	124409	237	2391	36912	11661	51201	1282	-	9276	108091	56961	175610
1969	2392	-	6836	86949	82795	178972	436	2191	18562	15615	36804	2828	-	9027	105511	98410	215776
1970	1853	-	4423	64908	107034	178218	561	4675	26127	22763	54126	2414	-	9098	91035	129797	232344
1971	2593	-	3127	4895	131362	141977	1026	4097	10863	21815	37801	3619	-	7224	15758	153177	179778
1972	2938	-	454	45182	100920	149494	804	2319	14158	13966	31247	3742	-	2773	59340	114886	180741
1973	1918	-	9282	46499	119098	176797	392	520	14770	7185	22867	2310	-	9802	61269	126283	199664
1974	2951	-	2092	148519	162267	315829	420	1064	16426	3958	21868	3371	-	3156	164945	166225	337697
1975	2393	2	4593	32388	212485	251861	186	192	15803	8124	24305	2579	2	4785	48191	220609	276166
1976	2243	11	6934	87919	95956	193060	203	1004	18048	7718	26973	2446	11	7938	105964	103674	220033
1977	4500	5	3690	48675	200455	257325	846	2530	14296	26607	44279	5346	5	6220	62971	227062	301604
1978	9819	12	7335	325503	189279	531948	1211	2981	35281	12257	51730	11030	12	10316	360784	201536	583678
1979	10706	57	31438	167411	140789	350401	747	8487	25247	11975	46456	11453	57	39925	192658	152764	396857
1980	6311	40	29842	227352	180792	444337	1397	8625	63778	19622	93422	7708	40	38467	291130	200414	537759
1981	7929	56	31562	232479	169708	441734	2021	13416	28741	32866	77082	9950	94	44978	261220	202574	518816
1982	5892	10	91690	230281	183335	511208	1011	14612	54249	18580	88460	6903	18	106302	284530	201915	599668
1983	10308	27	49735	76913	319437	456420	-	-	-	-	-	-	-	-	-	-	-
1984	8455	6	67875	119381	146442	342159	-	-	-	-	-	-	-	-	-	-	-
1985	19491	166	21968	3647	134928	180200	-	-	-	-	-	-	-	-	-	-	-
1986	6395	233	35600	41260	146912	230400	-	-	-	-	-	-	-	-	-	-	-
1987	7080	207	24279	2260	102457	136283	-	-	-	-	-	-	-	-	-	-	-
1988	4096	1252	37214	74604	107966	225132	-	-	-	-	-	-	-	-	-	-	-
1989	5707	265	44091	123	42625	92811	-	-	-	-	-	-	-	-	-	-	-
1990	8895	434	56712	501	65123	131665	-	-	-	-	-	-	-	-	-	-	-
1991	6068	203	63647	-	86871	156789	-	-	-	-	-	-	-	-	-	-	-
1992	4541	296	105418	6284	83394	199933	-	-	-	-	-	-	-	-	-	-	-
1993	8972	279	43283	157574	53562	263670	-	-	-	-	-	-	-	-	-	-	-
5-Year avg. <sup>d</sup>	5861	490	61423	16347	77196	161317	-	-	-	-	-	-	-	-	-	-	-
10-Year avg. <sup>e</sup>	8104	309	50657	32519	123616	215205	-	-	-	-	-	-	-	-	-	-	-

<sup>a</sup> Includes 197 recorded sockeye salmon in all subdistricts

<sup>b</sup> Includes 93 recorded sockeye salmon in all subdistricts

<sup>c</sup> Includes 11 recorded sockeye salmon in all subdistricts

<sup>d</sup> 1988-1992

<sup>e</sup> 1983-1992

<sup>f</sup> These figures also include data from Stebbins and St. Michael.

<sup>g</sup> Includes 38 sockeye salmon.

<sup>h</sup> Includes 8 sockeye salmon.

<sup>i</sup> Incomplete subsistence surveys.

Appendix C. Comparative salmon escapement estimates of  
Norton Sound streams, 1961–1993<sup>a</sup>.  
(Source:CFM&D)

Year	Chinook	Chum	Pink	Pink & Chum <sup>b</sup>	Coho
Sinuk River					
1975	—	4,662	5,390	—	—
1977	—	5,207	1,302	—	—
1978	—	8,756	22,435	—	—
1980	3	2,022	199,000	—	1,002
1981	—	5,579	350	—	—
1982	—	638	148,800	—	—
1983	48	2,150	10,770	—	96
1984	7 <sup>h</sup>	493 <sup>h</sup>	284,400 <sup>h</sup>	—	192
1985	4	1,910	8,860	—	33
1986	4	1,960	28,690	—	—
1987	5	4,540	30	—	230
1988	3	2,070	4,652 <sup>i</sup>	—	563
1989	—	1,025	26,850	—	75
1990	—	95	29,040	—	161
1991	3	5,420	14,680	—	701
1992	—	470	292,400	—	422
1993	7	1,570	5,120	—	104
Nome River					
1971	—	75	7,765	—	—
1972	—	710	14,960	—	—
1973	6	1,760	14,940	—	—
1974	—	854	17,832	—	—
1975	1	2,161	3,405	—	—
1977	5	3,046	1,726	—	—
1978	2	5,242	34,900	—	—
1980	5	—	—	179,095	920
1981	15	1,195	12,565	—	—
1982	—	700	327,570	—	—
1983	2	198	9,170	—	365
1984	—	2,084 <sup>h</sup>	178,870	—	839
1985	7	1,967	2,250	—	242
1986	2	1,150	13,580	—	—
1987	3	1,646	1,400 <sup>h</sup>	—	419
1988	3	973	2,490 <sup>i</sup>	—	1,280 <sup>h</sup>
1989	2	72	1,365	—	375
1990	—	541	13,085	—	617
1991	9	3,520	4,690	—	611
1992	3	813	255,700	—	691
1993	56 <sup>d</sup>	1,520	9,212 <sup>d</sup>	—	3,061 <sup>d</sup>
Flambeau River					
1976	—	375	1,994	—	—
1977	—	1,275	10	—	—
1978	—	7,110	—	—	—
1979	—	283	291	—	—
1980	—	—	—	29,190	—
1981	1	12,031	2,710	—	—
1982	1	5,097	25,001	—	—
1983	2	1,195	200	—	—
1984	1	3,150 <sup>g</sup>	20,200 <sup>g</sup>	—	—
1985	1	3,215	260	—	—
1986	2	3,075	300	—	—
1987	0	115	0	—	—
1988	3	765	10	—	—
1989	—	—	—	—	—
1990	—	—	—	—	—
1991	2	1,564	570	—	—
1992	—	606	180	—	—
1993	—	1,590	—	—	—

—Continued—

Year	Chinook	Chum	Pink	Pink & Chum <sup>b</sup>	Coho
Eldorado River					
1974	13	2,143	6,185	-	-
1977	-	1,835	125	-	-
1978	-	10,125	12,800	-	-
1980	6	9,900	55,520	-	-
1981	-	15,605	495	-	-
1982	2	1,095	163,300	-	-
1983	11	994	270	-	100
1984	14 <sup>i</sup>	4,361 <sup>si</sup>	1,924,935 <sup>si</sup>	-	261
1985	8	6,090	150	-	67
1986	9	3,490	18,200	-	-
1987	6	3,860	0	-	108
1988	17	2,645	1,045	-	78
1989	-	350	1,550	-	87
1990	17	884	2,050	-	44
1991	76	5,755	1,590	-	98
1992	-	4,887	6,615	-	113
1993	38	2,885	120	-	110
Fish River					
1961	1	-	-	14,100	-
1962	48	-	-	28,918	-
1963	21	-	-	25,728	-
1964	-	18,670	10,935	14,550	-
1966	7	-	-	17,955	-
1967	20	-	-	13,610	-
1968	10	-	-	164,000	-
1969	-	2,080	124,000	-	-
1970	33	76,550	198,000	-	-
1971	1	13,185	1,670	-	-
1972 <sup>b</sup>	-	3,616	13,050	-	-
1973	31	6,887	15,564	-	-
1974	7	10,945	15,690	-	-
1975	26	20,114	15,840	-	-
1976	1	8,390	15,850	8,550	-
1977	9	9,664	2,430	-	-
1978	29	26,797	140,640	-	-
1979	11	6,893	9,132	-	-
1980	-	19,100	33,500	-	-
1981	90	24,095	450	-	-
1982	-	-	-	241,700	-
1983	87	20,037	300	-	-
1984	42	-	-	293,245	-
1985	303	21,080	7,365	-	-
1986	200	25,190	140	-	-
1987	193	7,886	0	-	-
1988	36	1,240	29,950 <sup>1</sup>	-	-
1989	-	-	-	-	-
1990	-	-	-	-	-
1991	58	10,190	51,190	-	-
1992	4	390	1,387,000	-	-
1993	48	12,695	13,440	-	-
Kachavik Creek					
1963	-	16,000	16,000	-	-
1964	-	5,284	3,675	-	-
1966	-	758	1,788	-	-
1967 <sup>c</sup>	-	-	-	1,780	-
1969	-	600	4,525	-	-
1970	-	500	-	-	-
1971	-	1,000	5,323	-	-
1972	-	3,100	16,950	-	-
1973	-	10,325	22,275	-	-
1974	-	1,645	2,723	-	-
1975	-	1,735	23,360	-	-
1977 <sup>d</sup>	-	9,564	30,432	-	-
1978 <sup>d</sup>	-	3,481	26,533	-	-
1979	-	2,650	23,850	-	-
1982	-	1,111	72,235	-	-
1988	-	1,440	3,130	-	-

- Continued -

Year	Chinook	Chum	Pink	Pink & Chum <sup>b</sup>	Coho
Boston Creek					
1963	67	1,669	—	—	—
1964	10	3,315	—	—	—
1966 <sup>c</sup>	153	761	—	—	—
1968	7	2,500	2,500	—	—
1969	100	7,000	16,000	—	—
1970	246	8,200	12,900	—	—
1971	42	7,045	80	—	—
1972	57	4,252	3,950	—	—
1973	153	3,014	3,213	—	—
1974	231	2,426	749	—	—
1975	147	1,885	2,556	—	—
1977	76	1,325	385	—	—
1978	136	2,655	74,221	—	—
1979	58	882	271	—	—
1980	16	2,450	1,510	—	—
1982	10	1,730	22,020	—	—
1983	154	704	—	—	—
1984	35	—	—	47,850	—
1985	243	3,450	—	—	—
1986	2	220	0	—	—
1987	583	3,640	0	—	—
1988	163	1,040	7,400 <sup>l</sup>	—	—
1989	—	—	—	—	—
1990	—	1,455	8,440	—	—
1991	152	2,550	3,210	—	—
1992	68	1,540	803,200	—	—
1993	227	4,513	1,930	—	—
Niukluk River					
1962	11	—	—	27,879	—
1963	1	13,687	4,103	—	—
1964	—	8,395	10,495	—	—
1966	—	21,300	8,600	4,700	—
1967	—	20,546	—	—	—
1968	—	—	—	87,085	—
1969	—	10,240	92,650	—	—
1970	—	7,300	60,350	—	—
1971	—	22,605	8,370	—	—
1972 <sup>c</sup>	—	10,500	22,600	—	—
1973	—	14,365	14,790	—	—
1974	1	8,720	8,915	—	—
1975	—	10,089	16,258	—	—
1976	—	4,130	7,190	—	—
1977	19	10,456	4,150	—	—
1978	2	14,365	208,300	—	—
1979 <sup>d</sup>	8	10,127	30,147	—	—
1980	—	8,915	75,770	—	—
1981	—	7,249	—	—	—
1982	20	2,557	227,540	—	—
1983	54	8,886	50	—	—
1984 <sup>j</sup>	6	—	—	57,208	3,072
1985	25	11,140	—	—	332 <sup>k</sup>
1986	2	2,442	0	—	—
1987	10	4,145	0	—	257 <sup>k</sup>
1988	18	6,501	8,160 <sup>l</sup>	—	1,095 <sup>k</sup>
1989	—	—	—	—	182
1990	—	6,200	—	—	170
1991	24	10,660	37,410	—	1,783
1992	—	7,770	803,200	—	812
1993	15	19,910	2,840	—	2,104

—Continued—

Year	Chinook	Chum	Pink	Pink & Chum <sup>b</sup>	Coho
Kwiniuk River					
1962	3	—	—	23,249	—
1963	2	11,340	3,779	—	—
1964	—	14,533	—	—	—
1965 <sup>d</sup>	14	26,634	8,301	—	—
1966 <sup>d</sup>	7	32,786	10,629	—	—
1967 <sup>d</sup>	13	24,444	3,508	—	—
1968 <sup>d</sup>	27	18,813	126,764	—	—
1969 <sup>d</sup>	12	19,687	56,683	—	—
1970 <sup>d</sup>	—	68,004	235,131	—	—
1971 <sup>d</sup>	37	39,046	16,742	—	—
1972 <sup>d</sup>	65	30,686	62,461	—	—
1973 <sup>d</sup>	57	28,617	38,420	—	—
1974 <sup>d</sup>	62	35,899	40,816	—	—
1975 <sup>d</sup>	44	14,344	57,317	—	—
1976 <sup>d</sup>	12	6,977	29,471	—	—
1977 <sup>d</sup>	84	22,757	46,234	—	—
1978 <sup>c,d</sup>	74	14,408	72,270	—	—
1979 <sup>d</sup>	107	12,355	167,492	—	—
1980 <sup>d</sup>	177	19,374	320,389	—	—
1981 <sup>d</sup>	136	34,561	566,417	—	—
1982 <sup>d</sup>	138	44,036	469,674	—	—
1983 <sup>d</sup>	267	56,907	251,965	—	—
1984 <sup>d</sup>	736	54,043	736,544	—	983 <sup>f</sup>
1985 <sup>d</sup>	712	9,912	22,548	—	673 <sup>f</sup>
1986 <sup>d</sup>	653	24,704	241,446	—	421
1987 <sup>d</sup>	314	16,134	5,567	—	819 <sup>f</sup>
1988 <sup>d</sup>	321	13,301	187,904	—	444 <sup>f</sup>
1989 <sup>d</sup>	282	13,689	30,275	—	— <sup>e</sup>
1990 <sup>d</sup>	744	13,735	404,452	—	746 <sup>e</sup>
1991 <sup>d</sup>	587	18,802	54,591	—	809 <sup>e</sup>
1992 <sup>d</sup>	479	12,077	1,464,717	—	532 <sup>e</sup>
1993 <sup>d</sup>	565	15,823	43,065	—	1,238
Tubutulik River					
1962	3	—	—	16,690	—
1963	9	16,069	4,355	—	—
1964	—	15,469	10,043	3,420	—
1966	—	5,514	26,000	—	—
1967	1	—	—	22,475	—
1969	3	12,040	12,788	3,045	—
1970	—	53,290	136,590	—	—
1971	—	16,820	7,500	5,065	—
1972 <sup>c</sup>	—	8,070	21,100	—	—
1973	131	5,383	15,665	—	—
1974	136	9,560	17,940	—	—
1975	7	17,141	38,003	—	—
1976	—	1,095	6,095	2,600	—
1977	—	8,540	4,685	—	—
1978	2	5,865	1,364	—	—
1979	—	812	1,624	—	—
1980 <sup>e</sup>	405	21,616	663,937	—	—
1982 <sup>c</sup>	49	2,044	53,605	—	—
1983	135	16,345	40,790	—	—
1984	139	56,210	93,600	—	—
1985	472	13,645	8,940	—	—
1986	453	5,975	35,680	—	—
1987	474	9,605	580	—	—
1988	561	4,660	114,450 <sup>l</sup>	—	—
1989 <sup>c</sup>	—	—	—	—	—
1990	397	4,350	186,400	—	—
1991	661	7,085	26,870	—	—
1992	260	2,595	138,600	—	—
1993	1,061	8,740	18,650	—	1,395

—Continued—



Year	Chinook	Chum	Pink	Pink & Chum <sup>b</sup>	Coho
North River					
1962	162	—	—	16,087	—
1963 <sup>c</sup>	287	—	—	73,274	—
1964	23	—	—	5,981	—
1965	153	—	—	16,600	—
1970 <sup>c</sup>	1	20,655	12,400	—	—
1971 <sup>c</sup>	256	—	—	1,047	—
1972 <sup>d</sup>	561	2,332	54,934	—	—
1973 <sup>d</sup>	298	4,332	26,542	—	—
1974 <sup>d</sup>	220	861	154,285	—	—
1975 <sup>c</sup>	60	5,237	17,885	—	—
1976 <sup>c</sup>	66	196	10,606	—	—
1977	1,275	8,139	4,565	—	—
1978	321	9,349	21,813	—	—
1979	735	1,130	9,500	—	—
1980	61	2,300	127,900	—	204
1981	68	405	575	—	263
1982	8	599	173,352	—	4,145
1983	347	4,135	4,980	—	—
1984 <sup>d</sup>	2,844	2,915	458,387	—	152 <sup>f</sup>
1985 <sup>d</sup>	1,426	4,567	4,360	—	2,045
1986 <sup>d</sup>	1,613	3,738	236,487	—	—
1987	445	392	0	—	680
1988	202	30	112,770 <sup>i</sup>	—	240
1989 <sup>c</sup>	—	—	—	—	—
1990	255	510	25,685	—	—
1991	656	2,435	118,720	—	2,510
1992	329	—	631,140	—	398
1993	900	445	13,570	—	1,397

<sup>a</sup> Represents "high count" for season.

<sup>b</sup> Surveyor unable to distinguish between the two species.

<sup>c</sup> Poor survey conditions or partial survey, poor counting tower conditions.

<sup>d</sup> Total counts obtained from counting tower.

<sup>e</sup> Combined tower and aerial survey counts below the tower.

<sup>f</sup> Aerial survey; not tower count.

<sup>g</sup> Helicopter survey.

<sup>h</sup> Boat survey.

<sup>i</sup> Foot survey.

<sup>j</sup> Includes counts from Casadepaga and Ophir Creeks.

<sup>k</sup> Includes counts from Ophir Creek.

<sup>l</sup> Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

Appendix D. Norton Sound 1993 Fishery Survey results: All  
Communities

1. Check one:

I fish for salmon for subsistence use.	53
I fish for salmon for commercial use.	1
I fish for salmon for both commercial and subsistence use.	15
no response	2

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink	45
chum	46
silver	56
red	14
king	44

area fished:

\*\*see results by community, Appendix E

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	1
catches down	16
catches stayed the same	2
no response; N/A	51

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	6
catches down	43
catches stayed the same	24
no response; N/A	1

5. If your catches have gone up or down, what was the reason for this?

no response	24
-------------	----

catches up:

able to get out fishing more often	1
returned to commercial fishing this year	1
putting away more fish than before	1
more people to feed	1

Appendix D. (continued)

catches down:

not sure/don't know	4
poor weather	6
False pass/Intercept Fisheries	8
personal health reasons	1
heavy commercial fishing	3
high seas fishing	3
ADF&G regulations/restrictions	11
lack of food for fish to feed on	1
you tell us	1
low number of chum returning	7
low number of pinks returning	2
low number of fish returning/lack of fish	11
seasonal changes	1
large # of gillnets in ocean just outside river mouths	1
no buyers for commercial fish	1
late breakup some years	1
no salmon enhancement program	1
too many trout in the rivers	2
high seas drift netting	1
American factory trawlers bycatch	1
people use purse seine nets to take too many fish	1
not going out fishing as much	1
lack of state funding	1

6. What kind of salmon would you like to see more of in your area?

king- 61	silver- 54	reds- 34
chum- 46	pink- 31	

no response 2

7. In which rivers or areas near your village would you like to see more salmon?

\*\*see results by community, Appendix E

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes	32
No	33
maybe	1
no response	5

9. Do you have any other comments or concerns?

\*\*see results by community, Appendix E

Appendix E.1. Norton Sound 1993 Fishery Survey Results -  
Brevig Mission

1. Check one:

I fish for salmon for subsistence use 2  
I fish for salmon for commercial use.  
I fish for salmon for both commercial and subsistence use. 1

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink 2  
chum 3  
silver 3  
red 2  
king 1

area fished:

Port Clarence Bay 2  
Grantley Harbor 1  
the beach at Brevig 1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down 1  
catches stayed the same  
no response; N/A 2

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down 1  
catches stayed the same 2  
no response; N/A

5. If your catches have gone up or down, what was the reason for this?

No response 2

catches down:

weather 1

6. What kind of salmon would you like to see more of in your area?

king- 3 silver- reds- 2  
chum- 1 pink-

Appendix E.1. (continued)

7. In which rivers or areas near your village would you like to see more salmon?

Agiapuk River	1
Tuksuk Channel	1
California River	1
Brevig Lagoon	1
no response	1

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes	1	- California River, Black Mountains
No	2	

9. Do you have any other comments or concerns?

No response	1
-------------	---

1. Lots of pinks around Pt. Clarence in July.

2. Comment on halibut and herring fishery.

Appendix E.2. Norton Sound 1993 Fishery Survey Results - Elim

1. Check one:

- |                                                            |   |
|------------------------------------------------------------|---|
| I fish for salmon for subsistence use.                     | 2 |
| I fish for salmon for commercial use.                      |   |
| I fish for salmon for both commercial and subsistence use. | 4 |

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink	4
chum	5
silver	4
red	
king	4

area fished:

Subdistrict 333-33	1
Tubuktulik River	4
Kwiniuk	2
Moses Point	2
Kwik River	1
no response	1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	
catches down	4
catches stayed the same	
no response;N/A	2

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	1
catches down	3
catches stayed the same	2
no response;N/A	

5. If your catches have gone up or down, what was the reason for this?

catches up:

was able to go out fishing more often	1
---------------------------------------	---

catches down:

False Pass/intercept fisheries	1
high seas fishing	1
ADF&G regulations/restriction	3
low number of fish returning	2
lack of food for fish to feed on	1
you tell us	1

Appendix E.2. (continued)

6. What kind of salmon would you like to see more of in your area?

king-	5	silver-	6	reds-	1
chum-	5	pink-	1		

7. In which rivers or areas near your village would you like to see more salmon?

Entire area around Elim and Moses Point	2
Kwiniuk River	3
Tubuktoolik River	5
Moses Point	1
Kwik River	1

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes 3 - Iron Creek  
Clear Creek  
Horseshoe Creek

No 3

9. Do you have any other comments or concerns?

No response 5

1. There has been no commercial fishing opening since 1986 for chums

2. Lots of pinks but no buyers

Appendix E.3. Norton Sound 1993 Fishery Survey Results - Gambell

1. Check one:

I fish for salmon for subsistence use. 1  
I fish for salmon for commercial use.  
I fish for salmon for both commercial and subsistence use.

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink 1  
chum 1  
silver 1  
red  
king 1

area fished:

Bering Sea around Gambell 1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down  
catches stayed the same  
no response;N/A 1

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down  
catches stayed the same 1  
no response;N/A

5. If your catches have gone up or down, what was the reason for this?

no response 1

6. What kind of salmon would you like to see more of in your area?

king- 1 silver- 1 reds-  
chum- 1 pink-

7. In which rivers or areas near your village would you like to see more salmon?

On the beach in front of Gambell 1  
Northern most point of St. Lawrence Island 1



Appendix E.3 (continued)

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes

No 1

9. Do you have any other comments or concerns?

No responses 1

Appendix E.4. Norton Sound 1993 Fishery Survey Results - Golovin

1. Check one:

I fish for salmon for subsistence use.  
I fish for salmon for commercial use.  
I fish for salmon for both commercial and subsistence use. 1

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink	1
chum	1
silver	1
red	1
king	1

area fished:

Fish River	1
Kitchavik River	1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	
catches down	1
catches stayed the same	
no response;N/A	

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	
catches down	1
catches stayed the same	
no response;N/A	

5. If your catches have gone up or down, what was the reason for this?

no response	1
-------------	---

6. What kind of salmon would you like to see more of in your area?

king-	1	silver-	1	reds-	1
chum-	1	pink-			

7. In which rivers or areas near your village would you like to see more salmon?

Fish River	1
Kitchavik River	1

Appendix E.4. (continued)

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes 1

No

9. Do you have any other comments or concerns?

No responses 1

Appendix E.5. Norton Sound 1993 Fishery Survey Results - Koyuk

1. Check one:

I fish for salmon for subsistence use.	2
I fish for salmon for commercial use.	
I fish for salmon for both commercial and subsistence use.	1

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink	3
chum	3
silver	2
red	1
king	2

area fished:

Ungalik River	1
Iglootalik River	1
Koyuk River	2

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	
catches down	1
catches stayed the same	
no response;N/A	2

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	
catches down	2
catches stayed the same	1
no response;N/A	

5. If your catches have gone up or down, what was the reason for this?

no response	1
-------------	---

catches down:

I don't know	1
False Pass/Intercept fisheries	1
personal health reasons	1
low number of chum returning	1
weather	1

6. What kind of salmon would you like to see more of in your area?

king- 2	silver- 2	reds- 1
chum- 3	pink- 2	

Appendix E.5. (continued)

7. In which rivers or areas near your village would you like to see more salmon?

all rivers	1
Koyuk River	1
no response	1

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes	1 - Granite Mountain Hot Springs, flows into Sweepstake and Peace Rivers
No	2

9. Do you have any other comments or concerns?

No response	1
-------------	---

1. I would like to see more biological studies done in all the headwaters of the salmon use or spawning areas in Norton Sound.

2. Most chum decline blamed for False Pass fishing. We are asking for closure of False Pass fishing, it affects Northwest Alaska chum catch.

Appendix E.6. Norton Sound 1993 Fishery Survey Results - Nome

1. Check one:

I fish for salmon for subsistence use. 15  
I fish for salmon for commercial use.  
I fish for salmon for both commercial and subsistence use. 1

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink 7  
chum 8  
silver 11  
red 2  
king 5

area fished:

no response 1  
Nome River 10  
Snake River 4  
Solomon River 4  
Pilgrim River 3  
Kuzitritin River 1  
American River 1  
Agiupuk River 1  
Unalakleet River 1  
Sinuk River 2  
Ocean in front of Hastings Creek 1  
coastal waters 2  
Nook 1  
ocean 1  
Council 1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down 1  
catches stayed the same  
no response;N/A 14

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up 1  
catches down 14  
catches stayed the same 3  
no response;N/A

Appendix E.6 (continued)

5. If your catches have gone up or down, what was the reason for this?

no response 3

catches down:

ADF&G regulations/restrictions	7
low number of chum returning	2
low number of pinks returning	1
not sure/don't know	1
seasonal changes	1
large # of gillnets in ocean just outside river mouths	1
lack of fish	4
not going out to fish as much	1
too many trout in the rivers	1
lack of state funding	1
weather	1

6. What kind of salmon would you like to see more of in your area?

king- 15	silver- 16	reds- 8
chum- 9	pink- 9	

7. In which rivers or areas near your village would you like to see more salmon?

Nome River	9
Penny River	2
Cripple River	1
Sinuk River	4
Pilgrim River	2
Solomon River	3
Bonanza River	1
El Dorado River	4
Snake River	5
Flambeau River	3
Tissuk River	1
all rivers in the area	4
no response	1

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes 6 - Nome River  
Snake River

No 7  
no response 3

Appendix E.6. (continued)

9. Do you have any other comments or concerns?

No response 7

1. Concerned about lack of chum salmon
2. Hope to see more instream incubation boxes for fish like those on Boulder Creek and Nome River.
3. Need "Spawn to Can"
4. Limit net fishing as a larger percent of net caught fish get wasted.
5. If limits on subsistence fishing are necessary, reduce fishing opportunities for all people. Instead of limiting fishing west of cape, limit the number of days all can fish and open areas to everyone!
6. Why do we buy licenses that are worthless during peak fishing seasons?
7. We need to dry fish in July, August is not a good month for drying.
8. We are loosing our subsistence lifestyle.
9. I believe that at any mouth of any river all persons should be restricted from rod; reel and/or seine / set-net fishing.



Appendix E.7. Norton Sound 1993 Fishery Survey Results - Savoonga

1. Check one:

I fish for salmon for subsistence use. 1  
I fish for salmon for commercial use.  
I fish for salmon for both commercial and subsistence use.

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink 1  
chum 1  
silver 1  
red 1  
king 1

area fished:

ocean near Savoonga 1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down  
catches stayed the same  
no response; N/A 1

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down  
catches stayed the same 1  
no response;N/A

5. If your catches have gone up or down, what was the reason for this?

no response 1

6. What kind of salmon would you like to see more of in your area?

king- 1 silver- 1 reds-  
chum- pink- 1

7. In which rivers or areas near your village would you like to see more salmon?

All around St. Lawrence Island 1

Appendix E.7. (continued)

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes

No 1

9. Do you have any other comments or concerns?

No response 1

Appendix E.8. Norton Sound 1993 Fishery Survey Results -  
Shaktoolik

1. Check one:

I fish for salmon for subsistence use.	2
I fish for salmon for commercial use.	
I fish for salmon for both commercial and subsistence use.	2
no response	1

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink	4
chum	4
silver	4
red	
king	4

area fished:

Shaktoolik River	3
Cape Denbigh	1
no response	1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	1
catches down	1
catches stayed the same	
no response; N/A	2

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	
catches down	4
catches stayed the same	
no response;N/A	

5. If your catches have gone up or down, what was the reason for this?

catches up:

returned to commercial fishing this year	1
------------------------------------------	---

catches down:

low number of fish returning	3
No buyers for commercial fish	1
low number of chum returning	1
heavy commercial fishing	1
late breakup some years	1

6. What kind of salmon would you like to see more of in your area?

king-	4	silver-	3	reds-	1
chum-	4	pink-	2		

Appendix E.8. (continued)

7. In which rivers or areas near your village would you like to see more salmon?

Shaktoolik River	4
Tagoomenik River	1

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes	2	- Shaktoolik River
No	2	

9. Do you have any other comments or concerns?

No response	2
-------------	---

1. Even a small hatchery would help.

2. Don't try to put too much control over our subsistence. Me as one subsistence user, I like to catch and eat when I want to.

Appendix E.9. Norton Sound 1993 Fishery Survey Results - Stebbins

1. Check one:

I fish for salmon for subsistence use. 3  
I fish for salmon for commercial use.  
I fish for salmon for both commercial and subsistence use.

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink  
chum 1  
silver 2  
red  
king

area fished:

ocean around Stebbins 2

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down  
catches stayed the same  
no response;N/A 3

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up 1  
catches down 1  
catches stayed the same 1  
no response;N/A

5. If your catches have gone up or down, what was the reason for this?

no response 2

catches down:

False Pass/intercept fishing 1

6. What kind of salmon would you like to see more of in your area?

king- 3 silver- 2 reds- 2  
chum- 1 pink- 2

7. In which rivers or areas near your village would you like to see more salmon?

Pikmiktalik River 1  
all areas near Stebbins 1

Appendix E.9. (continued)

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes

No 3

9. Do you have any other comments or concerns?

No response 2

1. I am not a commercial fishermen, but I would like to see that the fishing periods are open longer.

Appendix E.10. Norton Sound 1993 Fishery Survey Results -  
St. Michael

1. Check one:

I fish for salmon for subsistence use. 3  
I fish for salmon for commercial use.  
I fish for salmon for both commercial and subsistence use.

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink 2  
chum 2  
silver 3  
red 2  
king 1

area fished:

ocean near Stebbins 1  
Pikmiktalik River 2  
St Michael's Bay 1  
Golsovia River 1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down  
catches stayed the same  
no response; N/A 3

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up 1  
catches down 2  
catches stayed the same  
no response; N/A

5. If your catches have gone up or down, what was the reason for this?

catches down:

not sure/don't know 2  
low number of chums returning 1

6. What kind of salmon would you like to see more of in your area?

king- 2 silver- 2 reds- 2  
chum- 3 pink- 1

Appendix E.10. (continued)

7. In which rivers or areas near your village would you like to see more salmon?

Pikmiktalik River	2
Nungakaraq River <sup>a</sup>	1
Nunakogak River	1
all rivers in area	1

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes	1
No	1
Maybe	1

9. Do you have any other comments or concerns?

No response	1
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1. Please stop the "reaping" of our waters from the "rich U.S. of A" residents. They do the reaping and spend their money elsewhere with benefits.

2. We don't feed salmon to dogs, only herring.

<sup>a</sup> No such river could be located. Respondent may have misspelled the river.



Appendix E.11. Norton Sound 1993 Fishery Survey Results - Teller

1. Check one:

I fish for salmon for subsistence use. 1  
I fish for salmon for commercial use.  
I fish for salmon for both commercial and subsistence use.

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink 1  
chum 1  
silver 1  
red 1  
king 1

area fished:

Grantley Harbor 1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down  
catches stayed the same  
no response;N/A 1

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down 1  
catches stayed the same  
no response;N/A

5. If your catches have gone up or down, what was the reason for this?

catches down:

False Pass/Intercept fisheries 1  
heavy commercial fishing 1  
low number of salmon returning 1

6. What kind of salmon would you like to see more of in your area?

king- 1 silver- 1 reds- 1  
chum- 1 pink- 1

7. In which rivers or areas near your village would you like to see more salmon?

Grantley Harbor 1

Appendix E.11. (continued)

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes

No 1

9. Do you have any other comments or concerns?

1. You have to better regulate the food chain of the salmon and seal. You have got to better regulate the commercial bottom fishing industry.

Appendix E.12. Norton Sound 1993 Fishery Survey Results -  
Unalakleet

1. Check one:

I fish for salmon for subsistence use.	18
I fish for salmon for commercial use.	1
I fish for salmon for both commercial and subsistence use.	5
no response	1

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink	17
chum	13
silver	21
red	3
king	20

area fished:

Unalakleet River	21
North River	6
area 333-60(ocean)	2
Egavik	1
ocean	6
no response	1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	
catches down	7
catches stayed the same	2
no response; N/A	16

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up	2
catches down	11
catches stayed the same	12
no response; N/A	1

5. If your catches have gone up or down, what was the reason for this?

no response	11
-------------	----

catches up:

putting away more fish than before	1
more people to feed	1

Appendix E.12. (continued)

catches down:

no salmon enhancement program	1
over fishing on the high seas	2
heavy commercial fishing	1
weather	3
low number of chum returning	2
False Pass/intercept fisheries	4
too many trout in the rivers	1
high seas driftnetting	1
American factory trawler bycatch	1
ADF&G regulations/restrictions	3
low number of pinks returning	1

6. What kind of salmon would you like to see more of in your area?

king-	20	silver-	16	reds-	14
chum-	15	pink-	11		

no response 1

7. In which rivers or areas near your village would you like to see more salmon?

no response	6
Unalakleet River	9
North River	2
Kwik River	1
Egavik River	3
Golsovia River	2
Shaktoolik River	1
Ungalik River	1
Chirosky River	1
all rivers in Norton Sound	1
South River	1

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes 15 - South River drainage  
Unalakleet River  
North River  
Egavik River  
Golsovia River  
Shaktoolik River  
Ungalik River  
Old Woman River

No 8  
no response 2

9. Do you have any other comments or concerns?

no response

13

1. Subsistence fish is very important; do not close the waters nay day of the year. Fish is our only mainstay for subsistence. If you do catch limit and day closures you need to compensate the subsistence fisher.

2. It just seems we are not getting salmon like we used to in the past.

3. We do need a salmon enhancement program.

4. Subsistence usage may be an added stress to our river systems, but I contend that our historical harvest levels of salmon has diminished in relation to the downward curve of our returning salmon. We have survived this far with minimal damage to our natural resources.

5. Am in favor of instream hatch boxes but questions on hatchery planted fish.

6. All local communities should make their own traditional regulations, or input and be allowed revenue sharing to enforce their own customary laws of their own resources.

7. Subsistence use should have priority over commercial use every time.

8. More fish.

9. I believe king numbers are down substantially from 10 years ago. We are getting a few reds in the river, Don't know why since we don't have a lake of any size in the river system. A good red run would be nice if possible.

10. Yes, I have 15 years of concern and study with FRED Div. of ADF&G to improve the region.

11. Keep the sport fishermen out of Unalakleet rivers. They delay our commercial season for King salmon runs.

Appendix E.13. Norton Sound 1993 Fishery Survey Results - Wales

1. Check one:

I fish for salmon for subsistence use. 1  
I fish for salmon for commercial use.  
I fish for salmon for both commercial and subsistence use.

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink 1  
chum 1  
silver  
red  
king 1

area fished:

ocean in front of village 1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down  
catches stayed the same  
no response;N/A 1

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down 1  
catches stayed the same  
no response;N/A

5. If your catches have gone up or down, what was the reason for this?

no response 1

6. What kind of salmon would you like to see more of in your area?

king- silver- reds-  
chum- pink-

no response 1

7. In which rivers or areas near your village would you like to see more salmon?

Lopp Lagoon 1

Appendix E.13. (continued)

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes

No 1

9. Do you have any other comments or concerns?

1. Fisheries or development of probably unfeasible due to scarcity of resource.

Appendix E.14. Norton Sound 1993 Fishery Survey Results -  
White Mountain

1. Check one:

I fish for salmon for subsistence use. 3  
I fish for salmon for commercial use.  
I fish for salmon for both commercial and subsistence use.

2. Please name the kinds of salmon you fish for and where you catch them.

species caught:

pink 1  
chum 2  
silver 2  
red 1  
king 2

area fished:

Fish River 3  
Niukluk River 1  
Koochiblock River<sup>a</sup> 1  
Fox River 1

3. My commercial catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down  
catches stayed the same  
no response; N/A 3

4. My subsistence catches have gone up\_\_\_ or down\_\_\_ or stayed the same\_\_\_ in the past 10 years.

catches up  
catches down 2  
catches stayed the same 1  
no response; N/A

5. If your catches have gone up or down, what was the reason for this?

no response 1

catches down:

people using purse seine nets take too many fish 1  
lack of fish 1

6. What kind of salmon would you like to see more of in your area?

king- 3 silver- 3 reds- 1  
chum- 2 pink- 1



Appendix E.14. (continued)

7. In which rivers or areas near your village would you like to see more salmon?

Fish River	3
Fish River tributaries	1
Niukluk River	1
Klokerblok River <sup>a</sup>	1

8. It is important for us to know if there are any places where the rivers and streams do not freeze all winter long. These may be more favorable places for fishery development. Do you know of any places near your village where there are springs or open water in the winter?

Yes	2	- Koochiblock <sup>a</sup>
No	1	

9. Do you have any other comments or concerns?

No response	1
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1. The large number of fish being hauled off to Nome and used to improve the voting constituency of some political and corporation leaders.

2. If you make big hatcheries, make sure there are markets so there are not tons of unwanted hatchery fish.

<sup>a</sup> Koochiblock is the nickname for the Klokerblok River

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Appendix G. Contact sources.

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